Mini Literature Review Based on Brain Research and Its Effect on Educational Practice

by
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Abstract

The purpose of this literature review is to look at brain research and its effect on educational practice. For the last several years, educators, parents and policymakers have become increasingly interested in the potential role of positive early childhood experiences in promoting a child's emotional and intellectual well-being (Ellison, 2001). While this growing interest in early childhood and the impact of early life experiences is unquestionably a good thing, it has also contributed to the spread of sometimes inaccurate and frequently misunderstood information about what conclusions can be drawn from our knowledge of brain development (Fogarty, 2002).

This review looks at the implication of brain research and examines the relationship between the functionality of the brain, multiple intelligences and the educational practices occurring in our schools on a daily basis. Gardner's theory classifies human intellectual competencies in a totally new way, with more specific criteria than the traditional choice between "verbal" or "mathematical" (Hanson; & Hyun). Ellison (2001) states that Gardner proposes that intelligence cannot be described as a fixed quantity, but rather can be trained and increased. Ellison further states that each specific intelligence is independent from the others and can improve independently with use. Gardner's system of classification has already had a significant impact on how we think about the learning process, teaching, testing and even the nature of thought itself (Hanson).

Included in this review are each of Gardner's intelligences and how these can be used in educational settings to assist children understand and achieve in a manner tailored to their learning styles and functioning abilities.

Introduction

In the last couple of years, educators, parents and policymakers have become increasingly interested in the potential role of positive early childhood experiences in promoting a child's emotional and intellectual well-being (Ellison, 2001). Much of this interest has been sparked by numerous articles in the popular press claiming that recent advances in brain research can give parents guidance about everything from buying toys to choosing a preschool (Burgess, 2000). While this growing interest in early childhood and the impact of early life experiences is unquestionably a good thing, it has also contributed to the spread of sometimes inaccurate and frequently misunderstood information about what conclusions can be drawn from our knowledge of brain development (Fogarty, 2002). The scientific community has called the years from 1900-2000 "the decade of the brain" because it is during this period, building on the work of the preceding two decades, that scientific understanding of brain development increased exponentially (Halfon, 2001, & Katz, 2003).

As far as educators are concerned, the implication of brain research is profound and so is the association and direction of multiple intelligences. No longer is intelligence seen as narrow, fixed and inherited (Fogarty, 2002). Instead educators are beginning to view intelligence through a multifaceted filter and are becoming aware of the learning potential within every child (Burgess, 2000). Burgess also states that the best learning will occur when as many of the intelligences are both stimulated in new learning and also used to allow students to demonstrate or show what they know in a variety of ways.

Research Question

The research question for this mini literature review based on brain research and its effect on educational practice is: What is multiple intelligence and what is its connection to brain development in a primary education classroom? This question is of interest to the early childhood education arena because of the significance learning styles and intelligence has on a child's ability to perform at his/her best. Intelligence as defined by Martinez (2002) is a skill that enables a person to make a contribution to society; it was further described as an ability to learn. Intelligence as stated by Martinez resides in different areas of the brain and can function independently or in synergy with each other.

This question is also very important to the writer because the writer has a son with a partial hearing disability which impacts his language development (speech and reading). The second grader seems to learn better when he is able to utilize non-traditional learning methods and rely on other intelligences to excel in his studies. The question will assist this family as more information is obtained as to the connection of brain development and multiple intelligence and how this child can be successful in his second grade classroom and everyday learning environments.

Rationale for the Research Question

There are many reasons for studying how children learn. By learning about how children learn, students may be able to learn more effectively themselves and to know what difficulties they may face in the future (Hyun, 2000). Also, knowing about the limitations of learning, students may begin to anticipate problems (their own and those of

others) in learning how to relate better (McMahon, 2004). In recent years educators have explored links between classroom teaching and emerging theories about how people learn (Martinez, 2002). Exciting discoveries in neuroscience and continued developments in cognitive psychology have presented new ways of thinking about the brain-the human neurological structure and the attendant perceptions and emotions that contribute to learning (Stanford, 2004). Sheridan (2002) states that explanations of how the brain works have been described using metaphors that vary from the computer (an information processor, creating, storing, and manipulating data) to a jungle (a somewhat chaotic, layered world of interwoven, interdependent neurological connections).

Brain research provides rich possibilities for education; reports of studies from the early childhood field have become popular topics in many educational journals (Martinez, 2002). Enterprising organizations are translating these findings into professional development workshops and trainings to help teachers apply lessons from the research to classroom settings (Boston, 2003).

Cognitive science is devoted to the study of how people think and learn and how, when and whether they use what they know to solve problems (Boston, 2003). These cognitive perspectives in education encompasses how learners develop and structure their knowledge in specific subject areas and how assessments task might be designed to enable students to demonstrate the knowledge and cognitive processes necessary to be judge proficient in these subject areas (Sheridan, 2002). Boston stated that there are individual differences among learners, when large samples are studied, patterns tend to emerge, particularly related to erroneous beliefs and incorrect procedures. As an example, Boston used a subtraction bug that accounted for almost all of the ways young

children make mistakes when learning to count two-or three-digit numbers, these mistakes she commented are constant even across languages. Allowing for these variations among learners, it is possible to discover the most common pathways towards acquiring knowledge and the use of this information for diagnostic reasons (Boston).

The Brain and its Implications on Primary Education

Like much of human development, brain development is the result off a complex interaction between nature and nurture, between the unique genetic code an individual inherits and his/her experiences both before and after birth (Halfon, 2001, & Latham, 2002). Recent research in neurobiology and developmental psychology provides evidence of the specific processes involved in human brain development, particularly the process by which even the earliest experience affects brain development (Halfon). Much of what we know about brain development is derived from studies that involve extensive and invasive experimentations on rats, monkeys and other animals. Halfon commented that these experiments enable researchers to directly observe brain development by measuring and comparing physiological directly from the brains of animals under various conditions.

Latham (2002) states that because it is not possible to directly measure the cellular processes involved in human brain development, scientist rely upon a number of reasonable assumptions about the extent to which animal and human brain development is similar. Since some animal and human psychological behaviors are similar, scientist can also make inferences about the neurobiological processes underlying these behaviors (Halfon, 2001).

Ellison (2001) states that in the first three years of life, the number of synaptic connections in a young child's brain actually doubles to approximately 1,000 trillion, many more than will ultimately be present in the adult brain. These extra synaptic connections provide an important clue to how the brain is shaped by experience (Halfon, 2001). Beginning at age three and continuing over the next decade or more, synapses are selectively eliminated; by age fifteen, the number of synapses has decreased by about half and remains relatively stable throughout the rest of the individual's life (Halfon & Strickland 2002).

Selective elimination of synapses is essential to creating order in the human brain that some individual with an overabundance of synapses may have serious behavioral or cognitive disorders (Ellison, 2001). Similarly, studies of monkeys have indicted that cognitive ability reaches levels only after the selective elimination synapses has been completed (Halfon, 2001).

While neural and behavioral plasticity are present throughout life, the flexibility of the brain in the first years of life, and its adaptive capacity to grow and lay the groundwork for cognitive and emotional capacities in later life, is probably unmatched at any other time (Halfon, 2001). Latham (2002) acknowledges that is quite possible that the developing human brain can be more efficiently and more profoundly supported and enriched in the first years of life than at any other stage.

Early childhood educational programs allows families an opportunity that offers families, communities and our society the chance to ensure that each child reaches his or her productive and creative potential (Halfon, 2001). This opportunity offers the early childhood arena the chance to ensure that no child experiences sever or even mild

deprivation that may impair brain development and impose significant fiscal cost on school and health system (Halfon, 2001). Ellison (2001) commented that it takes a well functioning family, supported by a community, to grow a brain.

Opportunities for Learning

Most neuroscientists believe that at birth the human brain has all the neurons it will ever have (Halfon, 2001). Some connections, those that control such automatic functions as breathing and heartbeat, are in place at birth, but most of the individual's mental circuitry results from experiences that greet the newborn and continue, probably, throughout his or her life (Ellison, 2001). How and when neural connections are made is a topic of debate. Some researchers believe the circuits are completed by age five or six (Hyun, 2000). Other studies extend the period of development from birth to the later elementary school years (Latham, 2002). Still others argue that nerve connections can be modified throughout life with new connections forming perhaps even late in life (Burgess, 2000).

The links between learning, the number of neural connections, or the time frame for development of those connections are not clearly understood (Boston, 2003). In the case of sight, evidence suggests that after a critical development period vision is severely stunted or fails altogether (Boston). For musical learning, some researchers have found that the longer someone plays an instrument the more cortex will be dedicated to controlling the finger movements needed to play it (Strickland, 2002). Exposure to music and development of spatial reasoning (skills that can be transferred to mathematical understanding) seem to be connected (Strickland).

These and other findings encourage educators and parents to expose very young children to a variety of learning experiences, for example providing blocks and beads to handle and observe, talking to the child, playing peek-a-boo (Boston, 2003). Boston, continued by stating that it is not too early to engage such young children in discussions about patterns, beginning data analysis, sequencing, and number sense. Furthermore, it was stated that the introduction of a second language is best attempted in these early years as well (Ellison, 2001). In fact, some researchers look to the first year of life as the best "window of opportunity" for accelerated learning (Hyun, 2000).

Multiple Intelligence and Its Effect on the Brain

What is Intelligence?

Traditional views of intelligence base human intellect on the results of paper and pencil tests and statistical analysis (Hyun, 2000). If a test is reasonably challenging, some students score better and some worse. Those who perform better than most are said to have a higher amount of something called “intellect”, as expressed in a number or “quotient” – hence the term Intelligence Quotient, or IQ. (Ellison, 2001). Traditional views assume that intellect is an intrinsic quality, like height or hair color, something we can measure and that we will carry with us for the rest of our lives (Martinez, 2002). Classroom teachers with a traditional view of intelligence believe some students perform better than others due to different intellectual capabilities that are fixed and unchangeable (Ellison & Hanson, 2004).

The substance of intelligence will always be debated (Hanson, 2004). On a practical level, IQ is defined by the tests employed to measure it. Researchers suggest that

intelligence has many components, resulting in one's IQ that measures a singular intellect (Hyun, 2000). In the early 1980's, Dr. Howard Gardner, a professor of Education at Harvard University, challenged the view that intelligence is a singular property. In an effort to understand the nature of intelligence, he proposed a theory that based intelligence not on the results of specific tests, but on an individual's ability to solve problems (Hanson, 2004). Gardner's theory classifies human intellectual competencies in a totally new way, with more specific criteria than the traditional choice between "verbal" or "mathematical" (Hanson; & Hyun). Ellison (2001) states that Gardner proposes that intelligence cannot be described as a fixed quantity, but rather can be trained and increased. Ellison further states that each specific intelligence is independent from the others and can improve independently with use. Gardner's system of classification has already had a significant impact on how we think about the learning process, teaching, testing and even the nature of thought itself (Hanson).

The Brain and Multiple Intelligence

While Gardner's multiple intelligence theory first appeared in 1983, its impact in the schools today is reaching new heights (Fogarty, 2002). Increasingly, the idea of multiple intelligence provides a natural framework for instruction, curriculum and assessment decisions. Learners have unique profiles of intelligences, and while they are endowed with some bit of intelligence in many identified areas, they have peaks and valleys in their profiles (Gardner, 2004). More specifically, Gardner identifies areas of the brain processing that he labels intelligences. These include the visual/spatial and verbal/linguistic intelligences, the logical/mathematical and musical/rhythmic

intelligences, the bodily/kinesthetic intelligence, and the natural/physical world intelligence (Ellison, 2001; Fogarty, 2002; Gardner, 2004; Hanson, 2004; Kornhaber, 2004, & Nolen, 2003). A closer look at the intelligences reveals a literacy in each intelligence that fosters problem solving and production. In addition, Gardner discusses the idea of the multiple intelligences as entry points for learners (Nolen). Each learner has certain entry points that facilitate learning in the beginning (Fogarty & Kornhaber). Some learn best through reading, others via hands on approach, and still others access learning most easily through music (Fogarty). The intelligence also embody the concept of end states or authentic assessments of the learning (McMahon, 2004). Some learners express best what they know and are able to do through written artifacts, others through artistic endeavors, and still others through interpersonal dialogue and conversation (Nolen).

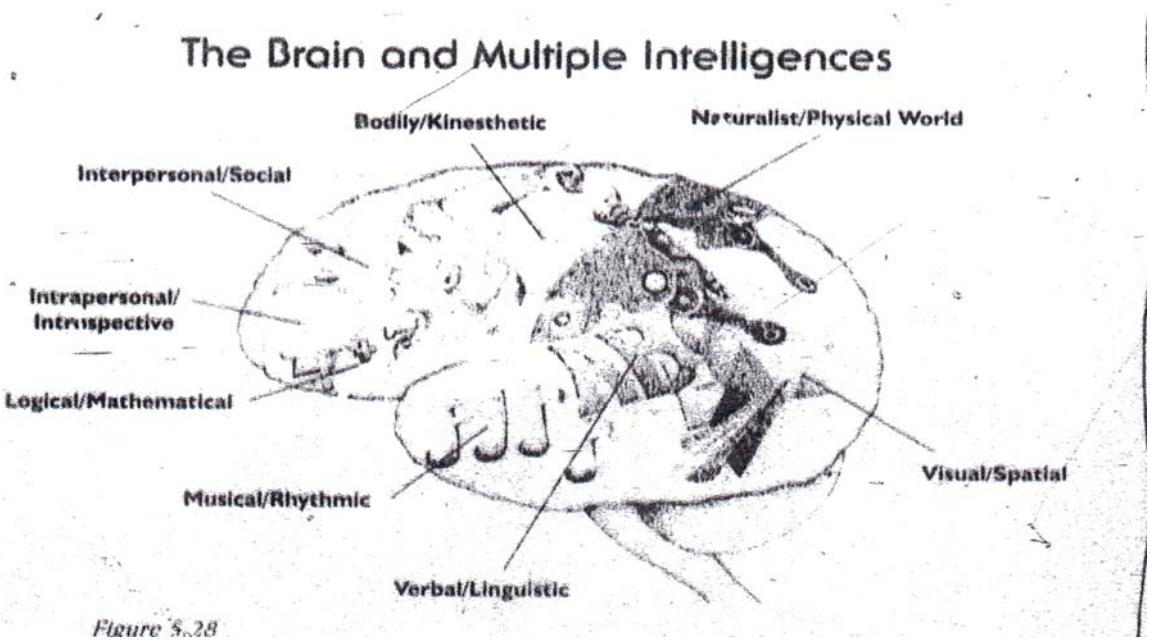

Figure 8.28

Multiple Intelligence in the Classroom

Due to the necessity to differentiate instruction, it is of the utmost importance that educators understand the varying effects and characteristics of multiple intelligences. Multiple Intelligence have been identified in the following areas, visual/spatial, verbal/linguistic, bodily/kinetic, musical/rhythmic, interpersonal/intrapersonal and those of a naturalistic point of view.

Visual/Spatial

Children who learn best visually and organize things spatially are considered to have visual/spatial intelligence. These children need to see what you are talking about in order for them to completely understand. They enjoy charts, graphs, maps, tables, illustrations, art, puzzles, costumes- anything eye catching (Stanford, 2003). Spatial intelligence gives the child the ability to manipulate and create mental images in order to solve problems (Nolen, 2003). Spatial thinkers "perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions, and to be able to re-create aspects of one's initial perceptions, even in the absence of relevant physical stimuli (Nolen). Spatial intelligence can lend itself to the ability of visual perceptions, while lacking in the ability to draw, imagine or transform (Hanson, 2004). Painting and sculpting often rely on spatial thinking; an artist's style often depends on their ability to visualize and create from a blank slate/canvas (Hanson).

Children with spatial intelligence are best taught using pictures or photographs (Ellison, 2001). It is often a good assessment to have them draw their ideas (Nolen,

2003). These students benefits from films, overheads, diagrams and other such visuals (Stanford, 2003).

Verbal/Linguistic

This intelligence is for children who demonstrate strength in the language arts: speaking, writing, listening and reading (Ellison, 2001). These students have always been successful in traditional classrooms because their intelligence lends itself to traditional teaching (Stanford, 2003). Children with linguistic intelligence memorize best using words (Nolen, 2003). Another advantage as stated by Nolen is that these students tend to be great at explaining, hence the amount of people with linguistic intelligence that are teachers. Additionally, they have the ability to analyze language and to create a better understanding of what people mean when using words (Hanson, 2004).

In order for teachers to help linguistic learners progress, they need to use language that the students can relate to and fully comprehend (Ellison, 2001). If used correctly, language can provide a bridge between the material and the learner (Gardner, 2004). Having children read, write and give oral reports about an element in their own lives such as sports, television, or popular bands develops linguistic intelligence (Nolen, 2003).

Mathematical/Logical

These children display an aptitude for numbers, reasoning and problem solving (Nolen, 2003). These are the other half of the children who typically do well in traditional classrooms where teaching is logically sequence and students are asked to conform (Nolen & Stanford, 2003). Mathematical-logical intelligence consist of the

ability to detect patterns, reason deductively, and to think logically (Hanson, 2004). Children first explore this intelligence by ordering and re-ordering objects (Ellison, 2001). In the beginning, math is conquered through the use of objects such as marbles or M&M's (Nolen). After time passes, children are able to do math in their heads without the use of manipulative (Stanford, 2003). As intelligence grows, the love of abstraction separates those with mathematical intelligence from the rest (Ellison). Nolen also noted that these children are able to follow long chains of reasoning very skillfully.

Bodily/Kinesthetic

These children experience learning best through activities: games, movement, hands on task, and building (Nolen, 2003). These learners were often labeled 'overly active" in traditional classrooms where they were told to sit and be still (Stanford, 2003)! Bodily-kinesthetic intelligence entails the ability to understand the world through the body (Nolen). These children can use their body in very expressive skilled ways for a distinct purpose (Hanson, 2004). They have very fine motor skills of the fingers and hands and control of their gross motor movements (Nolen). These characteristics along with the students' ability to manipulate objects and to carry out delicate movements using precise control lead these children into professions such as surgeon, sculptors, carpenters, plumbers, athletes, dancers and mimes (Nolen). Kinesthetic as noted by Nolen, is the capacity to act gracefully and to apprehend directly the actions or the dynamic abilities of other people or objects. This is what makes people with bodily intelligence good at performing arts (Nolen).

Nolen (2003), states that teaching children with bodily-kinesthetic intelligence can be optimized through the use of manipulatives and physical movement. Bodily-kinesthetic learners like to touch things in order to learn, they usually cannot sit still for long periods of time (Hanson, 2004). These children enjoy keeping their hands busy; therefore different tools should be bought into the classroom to accommodate them. If these students seem fidgety, simply giving them something to keep in their hands might solve this problem (Nolen).

Musical/Rhythmic

Stanford (2003), states that these children learn well through songs, patterns, rhythm, instruments and musical expression. It is easy to overlook children with this intelligence in traditional education (Ellison, 2001). Musical intelligence makes use of sound to the greatest extent possible (Hanson, 2004). Those with musical intelligence have a firm understanding of pitch, rhythm, and timbre (Nolen, 2003). Through music, the students are able to convey their emotions. Often, this intelligence is discovered at an early age and are apparent from the day a child learns to sing (Nolen). Children with this intelligence are usually able to read music, critique performances and adhere to musical-critical categories (Hanson).

For these children teachers should foster musical intelligence by introducing former musical analysis and representations (Strickland, 2002). Music can act as a way of capturing feelings, of knowing and understanding feelings, which is an important part of educating children (Nolen, 2003). Another reason musical intelligence should be valued is that it can be tied to other intelligences. For example, it relates to the logical-

mathematical intelligence in that music also contains ratio and regularity, as well as mathematical patterns (Nolen).

Intrapersonal

Children who convey this intelligence are especially in touch with their own feelings, values and ideas (Ellison, 2001). They may tend to be more reserved, but they are actually quite intuitive about what they learn and how it relates to them (Hanson, 2004). Intrapersonal as defined by Nolen (2003) deals more with the individual self. It is the ability to know oneself and to understand one's own inner workings. People with intrapersonal intelligence are usually imaginative, original, patient, disciplined, motivated and have a great deal of self-respect (Hanson). This intelligence is developed from internal resources (Ellison).

In everyday classrooms, children with this intelligence, need to be praised frequently (Nolen, 2003). Much of the development of intrapersonal intelligence depends on how the student wishes to use it. It can be aided through imagination exercises. These children should be given long term projects with various stages that need to be checked before moving onto the next (Ellison, 2001). Nolen commented that this will assist these learners in strengthening their abilities of patience and procedure. These students can see what needs to be done in their minds, and then they will make it happen (Stanford, 2003).

Interpersonal

Stanford (2003) identifies these children as noticeable people oriented and outgoing. He commented that they optimize learning cooperatively in groups or with a partner.

These children may have typically been identified as ‘talkative’ or “too concerned about being social” in a traditional setting (Ellison, 2001). Nolen (2003) states that interpersonal intelligence consist of the ability to understand, perceive and discriminate between people’s mood, feelings, motives and intelligences. Children with interpersonal intelligence are often found in professions such as teaching, politics, religious leaders, salesmen, skilled parents, therapist or counselors (Hanson, 2004).

Nolen (2003) states that interpersonal intelligence can be fostered through having students work together. The learning and the use of a culture’s symbol system leads to development of interpersonal intelligence (Ellison, 2001; & Hanson, 2004).

Naturalist

These are children who love the outdoors, animals and/or fieldtrips (Ellison, 2001). The traditional classroom has not been accommodating to these children (Stanford, 2003). Naturalist intelligence as noted by Hyun (2000), involves the ability to understand nature’s symbols and to respect the delicate balance that lets us continue to live. These children have a genuine appreciation of the aspects of nature and how they intertwine (Hanson, 2004). The people with this intelligence, puts the future first and are concerned about how man could be destroying or disturbing out planet for future generations (Hyun). People with naturalistic intelligence also show expertise in the recognition and classification of plants and animals (Hyun).

These children benefit from learning outdoors (Nolen, 2003). Teachers can accommodate them by planning activities such as: observing nature, labeling and mounting specimens from nature, noticing changes in the environment, sorting articles

from nature, using binoculars or telescopes to study nature, nature hikes, filed trips in nature, and caring for pets (Hyun, 2000). These activities allow students to have a hands on experience with what they are most comfortable with doing (Hanson, 2004).

The multiple intelligences as described are a better way for teachers to understand and accommodate different learning styles (Nolen, 2003). Teachers should structure the presentation of materials in a style, which engages all or most of the intelligences (Hanson, 2004). When teachers' center lesson on students needs, it optimizes learning for the entire class (Stanford, 2003). Teachers are now working on assimilating this knowledge into their strategies for helping children learn (Ellison, 2001). While it is easy to site all of the ramifications for multiple intelligence, it is clear that the day is past where educators teach the text book and it is the dawn of educators teaching each child according to their orientation to the world and their brain development (Fogarty, 2002).

Applications to Education

While multiple intelligence theory suggest several independent intellectual processes are at work in each child, they are rarely, if ever, mutually exclusive (Hanson, 2004). In fact, most complex problems and real life situations require the use of several intelligences (Fogarty, 2002). For example, a child who plays the piano, not only uses musical intellect to perform, he also employs interpersonal intelligence to communicate with other musicians and kinesthetic intelligence to manipulate the piano keys (Fogarty).

Classroom teachers might improve their methods by observing how students solve problems rather than simply preparing them for paper and pencil tests. In other words,

Hanson (2004) states that instruction should focus on the problem solving strategies that students should master to arrive at the answer, not on a rigid set of skills, and not only on the answer itself.

Implications for Developmentally Appropriate Practices

While every area has its merit, the theories of Howard Gardner have particularly strong ramifications in the classroom. McMahon (2004) states that if we can identify children's strengths among these eight intelligences, educators can accommodate different children more successfully according to their orientation to learning. As an antidote to the narrow definition of intelligence as reflected in standardize test results, Gardner's theories have been embraced and transformed into curricular interpretations across the country (Ellison, 2001). Many teachers instinctively respond to the notion that students learn and excel in a variety of ways, and believe that a classroom that offers an array of learning opportunities increases the likelihood of success for more students (Kornhaber, 2004). Hanson (2004) states that the goals of Gardner's theory and education is to encourage the development of well-rounded individuals.

Howard Gardner's theory of multiple intelligence has now been adopted and implemented for use in schools on six continents, from grade levels spanning pre-kindergarten through college, and for an enormous diversity of student populations: typical, special needs, gifted, juvenile delinquents, and adult learners (Kornhaber, 2004).

Kornhaber (2004) conducted a study that documented four reasons multiple intelligence has been positive in the educational arena. These fours reasons are as follows:

- Improvements in standardize test scores.
- Improvements in student's behavior.
- Increase parent participation.
- Improvements for students with learning disabilities (example improved learning, improved motivation, effort or social adjustment).

Kornhaber (2004) commented that she felt the improvements were associated with multiple intelligences due to the fact that children have different modalities and different ways to express themselves. Hanson (2004) connects increased performance when learning is taught through multiple intelligence as acceptance of one's culture in which many different kinds of learners were valued. He also stated that if students are engaged academically and socially, then it makes sense that fewer students will get into trouble behaviorally. Multiple intelligence may be associated with benefits for students with learning disabilities because the theory supports the idea that these students had strengths and not only weaknesses (Kornhaber). Acknowledging these strengths seemed to offer academic as well as emotional benefits (Hanson; Kornhaber & McMahon, 2004). Nolen (2003) also remarked that students with learning differences "feel good about being able to choose and play on strengths, while they're also working on weaknesses in other areas so that they can become more effective".

Environments for Learning

Recommended educational approaches consist primarily of trying to maintain a relaxed, focused atmosphere that offers options for learning in individually satisfying ways (Hanson, 2004). The old paradigm of students as empty vessels waiting to be filled with knowledge has given way to the constructivist belief that students continuously build understanding based on their prior experiences and new information. The idea of a fixed intelligence has given way to a more flexible perception of gradual intellectual development dependent on external stimulation (Hanson). Fogarty (2002) offers a view of the brain that could influence the future classroom. Her view of the brain as a jungle in which systems interact continuously in a chaotic fashion suggest that learners would thrive in an environment that provides many sensory, cultural and problem layers. These ideas suggest that students have a natural inclination to learn, understand and grow (Fogarty). Surround students with a variety of instructional opportunities and they will make the connections for learning (Gardner, 2004)

Multiple intelligence theory provides teachers and parents with an intellectual framework for tailoring education to the individual. Any teacher knows that in a classroom of thirty students, no two students are exactly alike (Hanson, 2004). Multiple intelligence theory structures the classroom to accommodate this diversity and encourages teachers to cultivate the student's individual approach to a problem (Fogarty, 2002). Hanson gives an example of this as follows: teachers might explain fractions using spatial intelligence – drawing fraction bars that physically represents a whole unit divided – or engage musical intelligence by relating fractions to rhythmic patterns.

Gardner (2004) point out that students are the best illustrators of how they solve problems. By classifying what intellectual strategies the student employs, the teacher can choose whether to reinforce particular strengths or encourage in intellectual areas where there are difficulties. It is still up to the teacher to determine what knowledge and skills should be developed in school, but the theory of multiple intelligence provides an adaptable – and revolutionary – framework within which to implement the specific goals of education (Gardner).

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